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(72) Inventor: Connarty, Jess  
Clelland North Lanarkshire ML1 5NA (GB)

(74) Representative: Kennedy, David Anthony et al  
Kennedys Patent Agency Limited,  
Floor 5,  
Queens House,  
29 St Vincent Place  
Glasgow G1 2DT (GB)

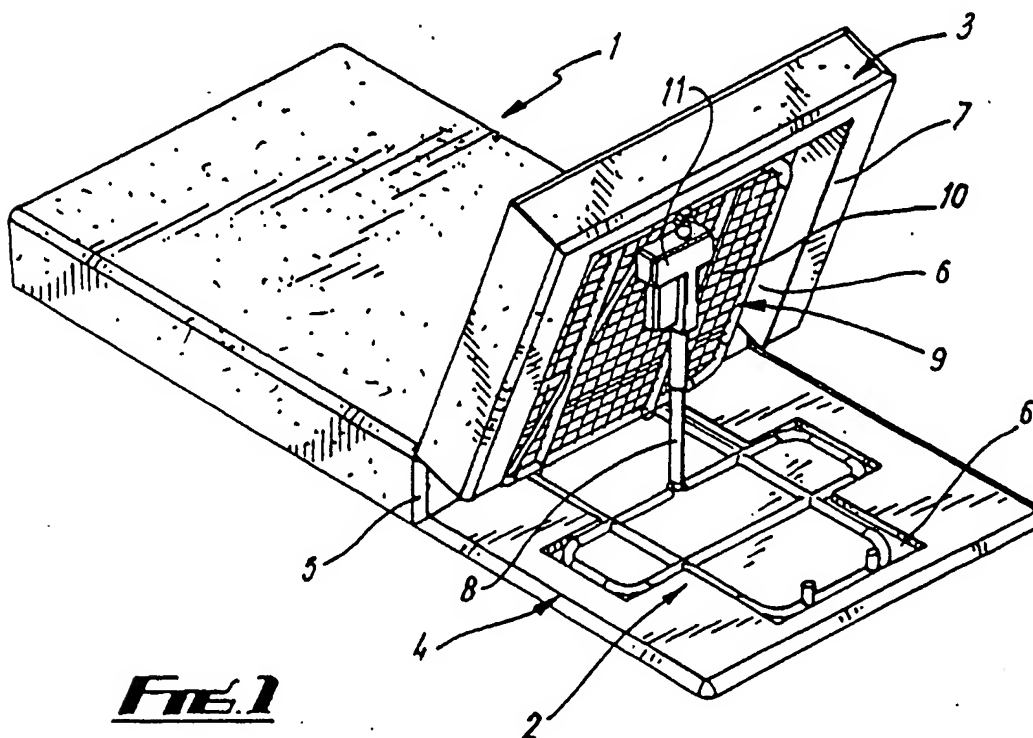
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(71) Applicant: Adam Hart Healthcare Limited  
Airdrie ML6 9SE (GB)

### (54) Adjustable mattress/cushion for use with a bed or chair

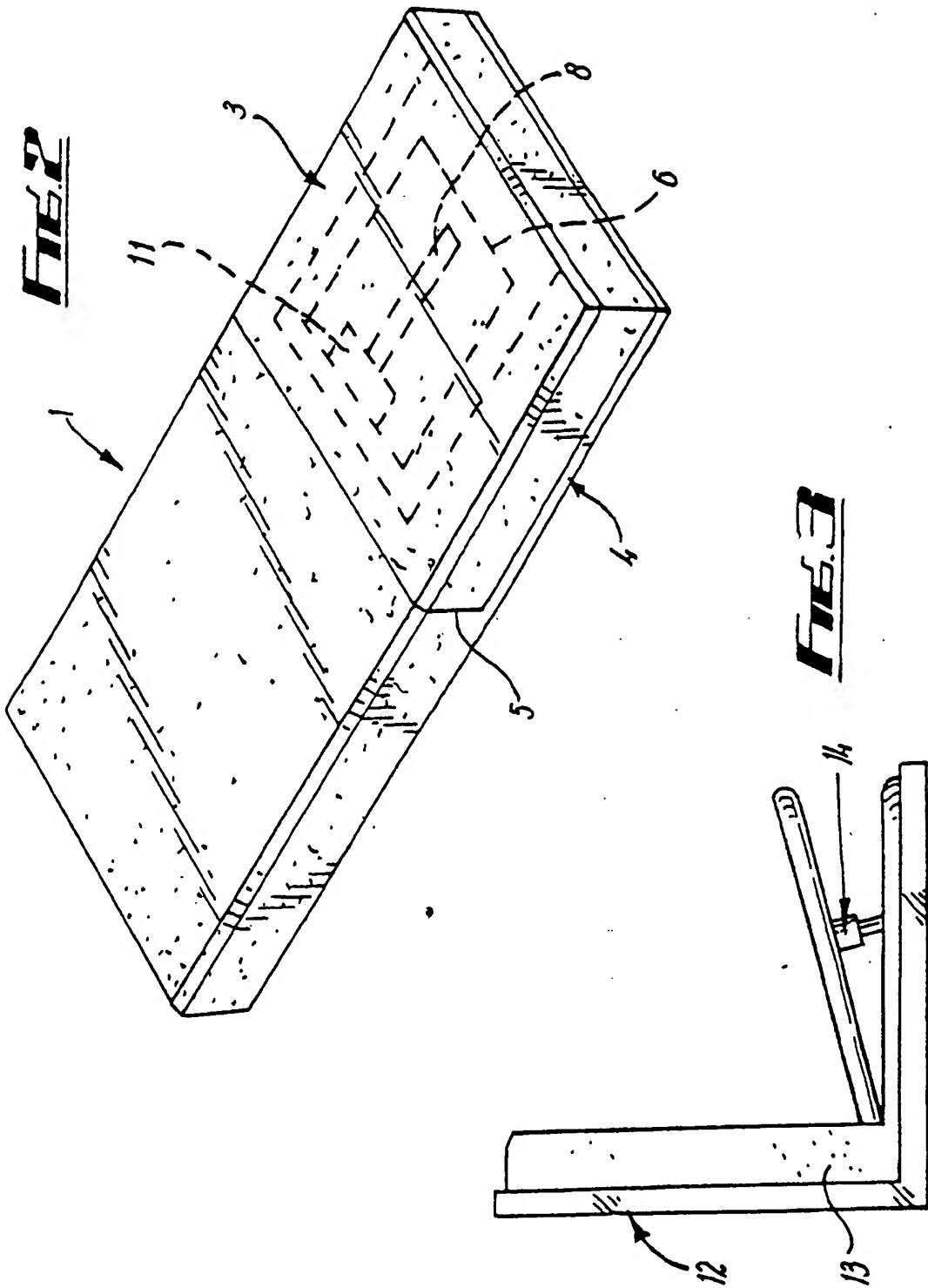
(57) An adjustable mattress (1) has an integral lifting mechanism (2). The mattress (1) is effectively divided into an upper section (3) and lower section (4) via a hinge mechanism (5) which allows the upper section (3) to be raised away from the lower section (4). Typically the lift-

ing mechanism (2) is comprised of a moveable arm (8) and a load bearing structure (9) which supports the upper section (3) of the mattress (1). The mattress (1) may be foam filled or sprung and may be suitable for a single or double bed.



**FIG. 1**

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## Description

[0001] The present invention relates to an adjustable mattress, which can be used in hospitals or nursing homes. The mattress may also be used domestically.

[0002] It has long been known that there are advantages in providing beds that can be adjusted in height and position when desired. Adjustable beds are particularly useful in hospitals and nursing establishments for sick or elderly patients. Such beds allow the position of the person in the bed to be adjusted, for example to support a patient in a sitting position in the bed and to increase the comfort of a bed-ridden patient. A particular advantage of this type of bed lies in the fact that the position of the patient can be adjusted without the patient or carer having to exert substantial physical strength. Such beds are also useful in combating poor circulation and bedsores in the bed-ridden patient.

[0003] Conventional adjustable beds are comprised of bed frames that are hinged or in some way split into individual sections, which can be moved relative to each other.

[0004] Usually a standard or hinged foam or spring mattress is placed on top of the frame. The mattress support frame can then be moved in such a manner to tilt or raise the mattress and therefore the position of the patient within the bed.

[0005] A disadvantage of the conventional type of adjustable beds is that the mechanisms for adjusting the position of the patient are incorporated into the actual bed or bed frame. It will be appreciated that, in the case of nursing homes or hospitals, it would be costly to purchase a large number of these highly specialised beds. A further disadvantage lies in the fact that these beds are usually cumbersome and are therefore difficult to move, for example, from one room to the next. This is a particular problem within hospitals where it may be desirable to move a particular patient from one ward to another or use the bed at different times in different wards. There is also a particular risk that as conventional adjustable bed frames have moving parts which are exposed, the patient using the bed or a bystander could be injured, or may become entrapped within the adjustment mechanism.

[0006] It is also recognised in the present invention that it would be advantageous to provide a similar adjustment mechanism within the cushion of a seat or chair. It is envisaged that a chair or seat which could be adjusted in such a manner would be particularly useful in a motor vehicle, for example to increase driving comfort, or to assist a disabled individual in leaving the vehicle.

[0007] It is therefore an object of the present invention to provide a mattress which can be used in conjunction with any standard bed or bed frame, which has a mechanism for adjusting the position of person within the bed, for example to raise a user into a sitting position or to raise the knees or legs of the user to aid circulation.

[0008] In particular, it is an object of the present invention to provide a mattress, which has an internal adjustment mechanism for adjusting the position of the person within the bed. It will be appreciated that by providing a mattress that has an integral adjustment mechanism, it will be relatively easy to transport the mattress from one room to another, or indeed one standard bed to another. It is also an object of the present invention to provide a mattress with internal adjustment mechanisms, which will eliminate the risk of a user or bystander trapping an extremity in the raising framework of an adjustable bed.

[0009] It is a further object of the present invention to provide a chair having an adjustment mechanism within the seat or cushion of the chair, which will allow the position of a person on the chair to be adjusted.

[0010] According to a first aspect of the present invention there is provided a mattress having one or more lifting mechanisms for adjusting the position of a section of the mattress, characterised in that the one or more lifting mechanisms are located within the mattress.

[0011] Preferably the mattress is divided into an upper and lower section via a hinge mechanism.

[0012] Preferably each of the upper and lower sections of the mattress have at least one recess which houses one or more lifting mechanisms.

[0013] Preferably the recess is defined by a garter component which encloses the one or more lifting mechanisms.

[0014] Preferably the one or more lifting mechanisms are moveable between a first and second position, wherein the upper and lower sections of the mattress are adjacent when the one or more lifting mechanisms are in the first position, and wherein the upper section of the mattress is raised away from the lower section of the mattress when the one or more lifting mechanisms are in the second position.

[0015] Preferably the one or more lifting mechanisms move from the first to the second position in less than 10 seconds.

[0016] Preferably the one or more lifting mechanisms are each comprised of a moveable arm.

[0017] Preferably the moveable arm of the one or more lifting mechanisms are attached to a load bearing structure.

[0018] Preferably the load bearing structure supports the upper surface of the mattress in the raised location in the second position.

[0019] Preferably the moveable arm of the one or more lifting mechanisms can be moved in incremental steps from the first position to the second, such that the upper surface of the mattress can be supported in a number of different raised locations.

[0020] Preferably the one or more lifting mechanisms comprises an actuator. Most preferably the actuator is motorised.

[0021] The one or more lifting mechanisms may be located within the mattress such that activation of the

lifting mechanism raises the upper body of the user into a sitting position.

[0022] The one or more lifting mechanisms may be located within the mattress such that on activation, the lifting mechanism acts as a knee break.

[0023] The mattress may be a single or double bed form.

[0024] Where the mattress is in a double bed form, preferably the mattress has two independent and adjacent lifting mechanisms, which allows the position of one side of the mattress to be adjusted independently of the other side of the mattress.

[0025] Optionally the raising mechanism is controlled by a remote handset.

[0026] Preferably the mattress has one or more grab handles.

[0027] The mattress may be foam-filled. Alternatively the mattress is a spring mattress.

[0028] Preferably the lifting mechanism has a noise level below 70 dbA.

[0029] Preferably the raising mechanism is capable of raising a static individual of a weight up to 175 kg.

[0030] According to a second aspect of the present invention there is provided a seat comprising a seat cushion having one or more lifting mechanisms for adjusting the position of the user of the seat, characterised in that the one or more lifting mechanisms are located within the seat cushion.

[0031] An example embodiment of the invention will now be illustrated with reference to the following figures in which:

Figure 1 illustrates an adjustable mattress having an integral lifting mechanism in a raised position in accordance with the present invention;

Figure 2 illustrates an adjustable mattress having an integral lifting mechanism in an alternative position, and;

Figure 3 illustrates a chair cushion with an integral lifting mechanism in a raised position.

[0032] Referring firstly to Figure 1, an embodiment of the adjustable mattress is generally depicted at 1. The adjustable mattress 1 has an integral lifting mechanism generally depicted at 2. In the present invention, the mattress has one lifting mechanism, but it will be appreciated that a number of independent lifting mechanisms could be incorporated into one mattress. The mattress 1 may be foam filled or sprung. It will also be appreciated that, although the adjustable mattress 1 of Figure 1 is in a single bed form, it would also be possible to provide a double bed form of the mattress 1.

[0033] Where the mattress 1 is in a double bed form, two independent raising mechanisms 2 will be housed within the mattress, typically adjacent to each other on either side of the double bed. In the double bed form,

the mattress 1 is effectively split along a centre line to allow one side of the mattress 1 to be raised independently of the other.

[0034] The mattress 1 is effectively divided into an upper section 3 and lower section 4 via a hinge mechanism 5 which allow the upper section 3 to be raised away from lower section 4 as shown in Figure 1. The hinge mechanism 5 is designed to minimise if not eliminate movement of the bed user down the mattress 1 as the raising mechanism 2 moves into the upright position shown in Figure 1. The hinge mechanism 5 has a locking torque of not less than 1200Nm when positioned, and typically operates for at least 10,000 cycles without failure. Both the upper 3 and lower 4 sections of the mattress have a recess 6 which houses the raising mechanism 2 and which is defined by a gaiter component 7. The gaiter component 7 seals off the inner workings of the raising mechanism 2 and is of a sufficiently robust design to protect either the bed user or any bystanders' extremities from entrapment in the raising mechanism 2.

[0035] The lifting mechanism 2 is comprised of a moveable arm 8, and a load bearing structure 9, which supports the upper section 3 of the mattress 1. The load bearing structure 9 of Figure 1 has a cage 10 configuration although this is not necessary for optimum functioning and may be removed in an alternative embodiment. The lifting mechanism 2 can move from a first position shown in Figure 2 to a second position shown in Figure 1. In the first position shown in Figure 2 the arm 8 lies essentially horizontal to, and within the recess (shown in broken lines 6) of the upper 3 and lower section 4 of the mattress 1. The upper 3 and lower 4 sections of the mattress lie adjacent and horizontal in the first position and the raising mechanism 2 fits within the recess 6 of the upper 3 and lower 4 sections. In the first position the adjustable mattress 1 will be indistinguishable from a normal mattress. In the second position, shown in Figure 1, the arm 8, is essentially vertical to the lower section 4 of the mattress 1, and the load bearing structure 9 supports the upper section 3 of the mattress 1 in a raised location. In the preferred embodiment the lifting mechanism 2 moves from the first to the second position smoothly, typically taking no more than 10 seconds. The lifting mechanism 2 may also move between the first and second position in incremental steps to allow the section of mattress to be raised at different angles according to the user's preference and comfort.

[0036] The lifting mechanism 2 may be housed at the end of the mattress nearest to the user's head, where it will act as a head-raising mechanism, that is to raise the user's upper body and head. The lifting mechanism 2 may also be housed nearest to the user's legs where it may act as a knee break, that is to lift the user's knees, for example to aid circulation. In one embodiment the mattress may have both a head-raising mechanism and a knee break. Where this is the case, the head-raising and knee break mechanisms can be adapted to use the same motorised actuator system to minimise costs and

maintenance. As both the head-raising mechanism and the knee break mechanism will be physically secured within the mattress, internal, non-intentional movement will be minimised.

[0037] The lifting mechanism 2 also comprises an actuator device 11. The actuator device 11 is typically motorised and will operate below 15 volts dc via a step down mains transformer. The maximum power consumption of the actuator 11 does not exceed 100 watts at 230v

To aid use, the lifting mechanism 2 may be controlled by a remote handset which could be used either by a bystander such as a nurse, or by the actual user of the bed. It will be appreciated that the present invention may have particular use for ill or elderly patients in hospitals or care and accordingly the handset will have controls that are readily identifiable, simple to understand and are large enough to be operated easily. To further aid lifting and manoeuvring of the patient on the mattress, the mattress 1 will typically have grab handles (not shown) on either side. Typically, the lifting mechanism will have a noise level below 70dbA, and will be capable of raising a static individual of a weight up to 175kg.

[0038] Figure 3 illustrates a chair, generally depicted at 12, which has a wide range of applications, for example in a vehicle such as a car, in a nursing home, in a dental surgery or domestically. The chair 12 has a cushion 13 with an internal lifting mechanism 14 identical to that described above. As the cushion 13 has an integral lifting mechanism 14, the cushion 13 could be transported from one location to another. The cushion 13 may be transported with the chair 12, in which case the chair 12 would be made from a lightweight and easily transportable material, or as a separate entity without the chair. It will be appreciated that this latter example would be useful to a disabled person, who could easily fit the cushion to, and remove the cushion from the seat of a car when required. This would eliminate the need for a specially adapted disabled car and would allow the disabled individual to easily adapt the seat of any car to his or her requirements and comfort. The adjustable cushion also has application for seating an infant or child.

[0039] The advantage of the present invention lies in the fact that as the adjustment mechanism is incorporated within the mattress or seat cushion itself, the mattress or seat cushion can be used with any standard bed frame or seat, and furthermore can be moved from one bed or seat to another. This is of particular advantage in hospitals or care homes as it is often desirable to move a patient between wards, and it will be appreciated that it is far easier to transport a mattress from one room to another as opposed to transporting an entire bed. In addition, as the raising mechanism of the present invention is sealed off within the mattress by the gaiter component, there is no risk of entrapment of a user or bystander's extremities as the mattress is provided as a customer sealed unit.

[0040] Further modifications and improvements may

be incorporated without departing from the scope of the invention herein intended.

### 5 Claims

1. A mattress having one or more lifting mechanisms for adjusting the position of a section of the mattress, characterised in that the one or more lifting mechanisms are located within the mattress.
2. A mattress as claimed in Claim 1, being divided into an upper and lower section via a hinge mechanism.
3. A mattress as claimed in Claim 2, wherein the upper and lower sections of the mattress have at least one recess which houses one or more lifting mechanisms.
4. A mattress as claimed in Claim 3, wherein the recess is defined by a gaiter component which encloses the one or more lifting mechanisms.
5. A mattress as claimed in any one of the preceding Claims, wherein the one or more lifting mechanisms are moveable between a first and second position, wherein the upper and lower sections of the mattress are adjacent when the one or more lifting mechanisms are in the first position, and wherein the upper section of the mattress is raised away from the lower section of the mattress when the one or more lifting mechanisms are in the second position.
6. A mattress as claimed in Claim 5, wherein the one or more lifting mechanisms move from the first to the second position in less than 10 seconds.
7. A mattress as claimed in any one of the preceding Claims, wherein the one or more lifting mechanisms are each comprised of a moveable arm.
8. A mattress as claimed in Claim 7, wherein the moveable arm of the one or more lifting mechanisms are attached to a load bearing structure.
9. A mattress as claimed in Claim 8, wherein the load bearing structure supports the upper surface of the mattress in the raised location in the second position.
10. A mattress as claimed in Claims 7 to 9, wherein the moveable arm of the one or more lifting mechanisms can be moved in incremental steps from the first position to the second, such that the upper surface of the mattress can be supported in a number different of locations.

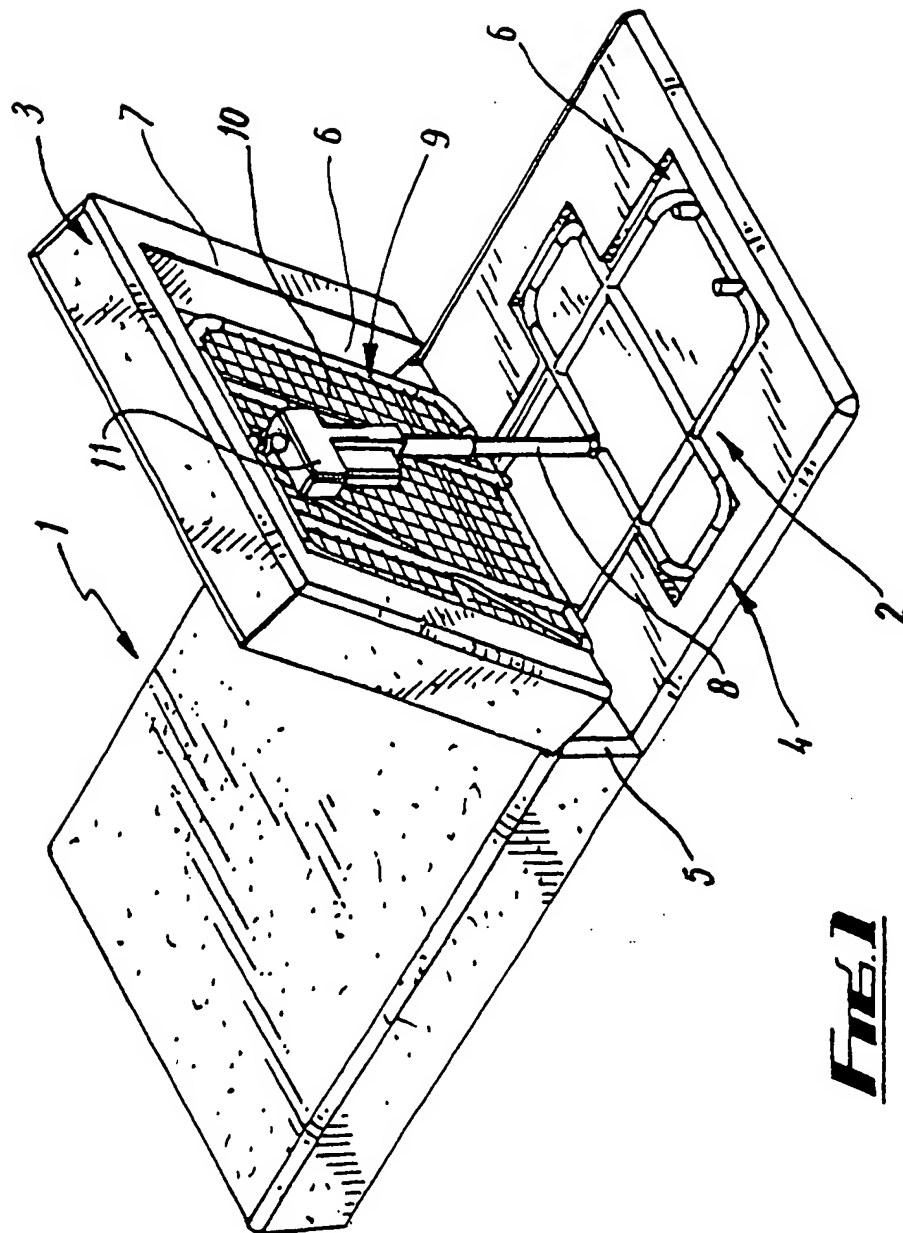
11. A mattress as claimed in any one of the preceding Claims, wherein the one or more lifting mechanisms comprises an actuator.
12. A mattress as claimed in Claim 11, wherein the actuator is motorised.
13. A mattress as claimed in any one of the preceding Claims, wherein the one or more lifting mechanisms are located within the mattress, such that activation of the one or more lifting mechanisms raises the upper body of the user into a sitting position.
14. A mattress as claimed in any one of the preceding Claims, wherein the one or more lifting mechanisms are associated within the mattress, such that on activation the one or more lifting mechanisms acts as a knee break.
15. A mattress as claimed in any one of the preceding Claims being in double bed form, wherein the mattress has two independent and adjacent lifting mechanisms, which allows the position of one side of the mattress to be adjusted independently of the other side.
16. A mattress as claimed in any one of the preceding Claims, wherein the one or more raising mechanisms are controlled by a remote handset.
17. A mattress as claimed in any one of the preceding Claims, having one or more grab handles.
18. A seat comprising a seat cushion having one or more lifting mechanisms for adjusting the position of the user of the seat, characterised in that the one or more lifting mechanisms are located within the seat cushion.

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